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Entry 1 of 2

File: EPAB

Apr 3, 1997

PUB-NO: WO009712007A1

DOCUMENT-IDENTIFIER: WO 9712007 A1

TITLE: HOT-MELT PRESSURE SENSITIVE ADHESIVE FOR HYGIENE APPLICATIONS

PUBN-DATE: April 3, 1997

**INVENTOR-INFORMATION:**

NAME COUNTRY

BAUDUIN, FRANCOIS FR

DREYFUS, THIERRY FR

GODEC, CATHERINE FR

INT-CL (IPC): C09J 123/08

EUR-CL (EPC): C09J123/08

**ABSTRACT:**

The invention discloses a hot-melt pressure sensitive adhesive composition characterised in that it includes (a) at least one ethylene-alkyl acrylate copolymer, (b) a tackifying resin, and optionally (c) a fluidising agent and/or a stabiliser and/or a wax. Such a composition can be advantageously used in the field of hygiene applications, particularly for fastening disposable nappies and sanitary napkins.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KMC | Image |
|------|-------|----------|-------|--------|----------------|------|-----------|--------|-----|-------|
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**2. Document ID: JP 11512759 W, WO 9712007 A1, FR 2739103 A1, AU 9670878 A, NO 9801224 A, EP 852612 A1, CZ 9800926 A3, SK 9800385 A3, CN 1197474 A, HU 9900032 A2, BR 9610692 A**

Entry 2 of 2

File: DWPI

Nov 2, 1999

DERWENT-ACC-NO: 1997-212880

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TITLE: Hot melt pressure sensitive adhesive having good adhesion to polyolefinic substrates - contg. ethylene!-alkyl acrylate! copolymer, tackifier resin and optionally plasticiser, stabiliser or wax

INVENTOR: BAUDUIN, F; DREYFUS, T ; GODEC, C

PRIORITY-DATA:

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PATENT-FAMILY:

| PUB-NO               | PUB-DATE          | LANGUAGE | PAGES | MAIN-IPC   |
|----------------------|-------------------|----------|-------|------------|
| JP 11512759 W        | November 2, 1999  | N/A      | 013   | C09J133/08 |
| <u>WO 9712007 A1</u> | April 3, 1997     | F        | 013   | C09J123/08 |
| FR 2739103 A1        | March 28, 1997    | N/A      | 010   | C09J133/08 |
| AU 9670878 A         | April 17, 1997    | N/A      | 000   | C09J123/08 |
| NO 9801224 A         | March 18, 1998    | N/A      | 000   | C09J123/08 |
| EP 852612 A1         | July 15, 1998     | F        | 000   | C09J123/08 |
| CZ 9800926 A3        | July 15, 1998     | N/A      | 000   | C09J123/08 |
| SK 9800385 A3        | September 9, 1998 | N/A      | 000   | C09J123/08 |
| CN 1197474 A         | October 28, 1998  | N/A      | 000   | C09J123/08 |
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| BR 9610692 A         | July 6, 1999      | N/A      | 000   | C09J123/08 |

INT-CL (IPC): A61F 13/15; A61L 15/16; C09J 5/06; C09J 11/02; C09J 11/08; C09J 123/08 ; C09J 133/08; C09J 133/08; C09J 193/00

ABSTRACTED-PUB-NO: WO 9712007A

BASIC-ABSTRACT:

Hot melt pressure-sensitive adhesive compsn. comprising (a) at least one ethylene-alkyl acrylate copolymer, (b) a tackifying resin and (c) optionally a plasticiser and/or a stabiliser and/or a wax.

Pref. the ethylene-alkyl acrylate copolymer preferably contains 15-45 wt. % alkyl acrylate. Preferably copolymers (a) are ethylene-methyl acrylate, ethylene-butyl acrylate and ethylene-2-ethylhexyl acrylate. The copolymer preferably has a melt index of 0.5-1000 and a viscosity of 1000-10000 mPa.s. A pref. compsn. contains (by weight) 20-50 % ethylene-alkyl acrylate copolymer, 30-80 % tackifying resin, 0-35 % plasticiser, 0-1.5 % stabiliser and 0- 15 % wax.

USE - Especially as adhesives in the fabrication of articles for personal hygiene contg. at least one polyolefinic support, esp. disposable nappies and sanitary napkins consisting of a layer of an absorbent material such as cellulose fluff or a chemical superabsorber protected on its outer face by a layer e.g. of polyethylene film that is impermeable to liquids, and covered on the inner face with a nonwoven film e.g. of polyethylene which is in contact with the skin and which allows the passage of body fluids to the absorbent material. The assembly may also include a barrier layer e.g. of polyolefinic material to prevent leakage.

ADVANTAGE - The adhesives have good adhesion to polyolefinic substrates such as nonwoven material of polyethylene or polypropylene, good cohesion and good resistance to water, and can be applied easily by coating, fiberisation, spraying or control-coating.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Image |
|------|-------|----------|-------|--------|----------------|------|-----------|--------|------|-------|
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| Terms              | Documents |
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| WO-9712007-\$.DID. | 2         |

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France  
WO 97/12007

HOT-MELT PRESSURE SENSITIVE ADHESIVE FOR HYGIENE APPLICATIONS  
[Colle Thermofusible Auto-adhesive Pour L'hygiene]

F. Baudin et al.

UNITED STATES PATENT AND TRADEMARK OFFICE  
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Inventor : F. Baudin, T. Dreyfus, C. Godec

Applicant : ATO Findley S. A.

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Foreign Language Title : Colle thermofusible auto-adhesive  
pour l'hygiene

English Title : Hot-melt pressure sensitive  
adhesive for hygiene applications

## HOT-MELT PRESSURE SENSITIVE ADHESIVE FOR

### HYGIENE APPLICATIONS

/1<sup>1</sup>

This invention has as its object a hot-melt pressure sensitive adhesive, its use in the area of hygiene, and the adhesive articles which are thereby produced, throw-away diapers and sanitary napkins in particular.

Throw-away diapers are normally made with an absorbing liner protected on its external side by a polyethylene film which is impermeable to liquids and lined on the inside by a film of non-woven material, generally made of polyethylene which comes in contact with the skin and allows the passage of body fluids through the said liner. Some more elaborate diapers can, in addition, have a leak-prevention barrier made of polyolefin and/or an elastic band.

The liners are prepared in the conventional by adhesion of the different components by the use of hot-melt adhesives whose composition varies according to the chemical nature of the components to be assembled. Such adhesives are, for example, described in the documents mentioned below.

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<sup>1</sup> Numbers in the margin indicate pagination in the foreign text.

In U.S. 4,526,577 an adhesive is proposed which includes a block copolymer A-B-A (in which A represents a non-elastomer sequence, styrene for example, and B represents butadiene or hydrogenated butadiene), an appropriate tackifying resin, an plastifying oil and a stabilization agent, and possibly a petroleum-based was.

In U.S. 4,460,728 there is description of an adhesive based on a vinyl or alkyl acrylate ethylene acetate copolymer, of tactic polypropylene and a suitable tackifying resin, possibly in the presence of a plastifying oil and/or a was of petroleum base and/or a stabilization agent.

In U.S. 4,939,202 an adhesive resistant to humidity is proposed which contains a propylene based amorphous polymer, a crystalline polymer with propylene base and a petroleum resin which contains hydrocarbons having from 4 to 10 atoms of carbon.

In U. S. 5,149,741 a hot-melt adhesive is used which includes a styrene-isoprene-styrene block copolymer, a suitable tackifying resin, a plastifying oil and a stabilizing agent, and possibly a was derived from petroleum.

As for sanitary napkins they generally include an absorbing liner of the cellulose fluff type or super-absorbing and an envelop with base of non-woven polypropylene or viscose on the

external side of the envelop an adhesive compound being applied which allows positioning on the under garment. The compounds described in the following documents have been proposed to be used in making such napkins. /2

In EP 0,104,005-A an adhesive based on a type A-B-A visco-elastic elastomer is proposed (in which B represents a polyolefin, an ethylene-butylene copolymer for example and A includes a polystyrene), and a tackifying resin.

Finally, in WO 93/10734 a compound is described which includes a copolymer with the formula (A-B)<sub>n</sub>-Y (in which Y is a multi-valent coupling agent, A is a vinyl monomer substituted by an aromatic radical and B is polybutadiene), a suitable tackifying resin and a plastifying oil.

The adhesives of the prior art which have just been cited are not at all satisfactory in the area of hygiene.

Thus, in the case of throw-ways diapers the polypropylene based hot-melt adhesives (U.S. 4,460,728 and U.S. 4,939,202) can with difficulty be used in traditional devices which employ fiber formation or spraying and the compounds described in U.S. 4,526,577 and U. S. 5,149,741 have poor water retention capacity which can result in loss of adhesive power especially of the absorbing liner next to the impermeable film.



In the case of sanitary napkins the aforementioned adhesive compounds turn out to be satisfactory in their application on a non-woven envelope. However, it has been determined that the said compounds are not adapted to the preparation of latest generation ultra fine sanitary napkins, which include an envelope consisting of a polyethylene based openwork or perforated film. Indeed it has been found that the use of compounds based on a copolymer of vinyl ethylene-acetate will lead to smudging of the envelope and that the adhesives in accordance with EP 0,104,005-A and WO 93/10734 must be applied at a high temperature, on the order of 150 to 180 degrees C, in order to adhere satisfactorily to the support.

It has now been found that there are new self-adhesive thermoplastic compounds available which do not have the aforementioned disadvantages, these compounds being characterized in that they include

- a) at least one alkyl ethylene-acrylate copolymer
- b) a tackifying resin
- c) possibly a thinning agent and/or a stabilizing agent  
and/or a wax.

The alkyl ethylene-acrylate copolymer in accordance with the invention is generally selected among the copolymers which

contain 15 to 45% and preferably 25 to 35% by weight of alkyl acrylate.

In an advantageously way the alkyl acrylate is selected among methyl acrylate, butyl acrylate and 2-ethylhexyl acrylate. Preferably one will use butyl acrylate. /3

In general one will use such copolymers which have a melt index between 0.5 and 1000 and preferably between 2 and 500.

Among the mixtures of the aforementioned copolymers which can be used, one can cite in particular the mixtures with a copolymer base that have an acrylate content between 15 and 40%, preferably between 30 and 35%, and a melt index between 500 and 2, preferably between 320 and 2.

The tackifying resin in accordance with the invention is selected among the group comprised by the solid or liquid hydrocarbon resins such as the aliphatic or aromatic resins, not hydrogenated or hydrogenated completely or partially, for example Escorez 5300 of Exxon and Imarv S 100 S of Idemitsu, resins based on esters of natural or modified colophane, polymerized for example, especially the esters of pentaerythritol or glycerol, Unitac R 100 L of Union-Camp for example, modified polyterpene or polyterpene resins, Wingtack made by Goodyear for example and the

alpha-methyl-styrene resins, Uratack 68520 for example made by DSM.

The thinning agent in accordance with the invention is selected from among the aliphatic or naphthene oils, plastifying agents such as the phthalates, adipates and benzoates, oligomeric or polymeric olefins of low molecular weight, polypropylene, polybutene and hydrogenated polyisoprene.

The was in accordance with the invention is generally selected from among the waxes of petroleum origin or the "Fischer Tropsch" synthetic waxes.

The stabilizing agent in accordance with the invention is generally selected from among the anti-oxidants such as the substituted phenols, Irganox 1076 made by Ciba-Geigy for example, and the phosphites.

The hot-melt pressure sensitive adhesive in conformity with the invention includes generally from 20 to 50% by weight, and preferable 40 to 60%, of a tackifying resin, from 0 to 35% by weight, and preferably 10 to 25%, of a thinning agent, from 0 to 1.5% by weight of stabilizing agent and from 0 to 15% by weight of wax.

In an advantageous manner the compounds in accordance with the invention have a viscosity between 1000 and 10,000 mPa.s (Brookfield viscosity meter - temperature 150-170 degrees C).

The compounds in conformity with the invention are generally obtained by mixing at a temperature varying from 120 to 170 degrees C.

The compounds produced in this way will have good adhesion on polyolefin supports such as films and non-woven materials made of polyethylene or polypropylene, good cohesion and good resistance to water. In addition, these compounds can be employed very easily according to techniques known in the field of hygiene, in particular by coating, fiber formation, spraying or control-coating. /4

The hot-melt pressure sensitive compounds in accordance with the invention are highly recommended for the manufacture of articles which pertain to the field of hygiene, especially throw-away diapers and sanitary napkins, articles which also are an object of the invention. These compounds are advantageously used to make liners which include one or several synthetic films of various kinds, elastic or non-elastic. One can, in addition, use them to stabilize and fix the absorbing lining, which is generally based on cellulose absorbent cotton (fluff).

The examples which follow allow one to illustrate the invention. Examples 1 to 8 and 12 deal with throw-away diapers and examples 9 to 11 pertain to sanitary napkins.

#### Example 1

In a mixture kept at 130 degrees C one adds 103 g of dioctylphthalate, 400 g of butyl ethylene-acrylate copolymer (Lotryl® 35 BA 320; butyl acrylate: 35%; Melt Index: 320; Elf Atochem S. A.), 490 go tackifying agent (Escorez 6372; Exxon) and 0.7 g of anti-oxidant (Irganox 1010; Ciba-Geigy). After total homogenization one will get a hot-melt compound that has a Brookfield viscosity equal to 4500 mPa.s at 150 degrees C.

The compound obtained in this way is deposited by fiber formation on a film of polyethylene at the rate of 10 g/m<sup>2</sup>. The pasting down is done on the one hand on a non-woven polypropylene material and on the other hand on a polyethylene film.

The measurements performed after application of the coating test at 180 degrees and 200 mm/min are equal to 4N/25 mm and 4.4N/25 mm for the polyethylene non-woven materials and polyethylene/polyethylene materials respectively.

#### Example 2

One works under the conditions of example 1 in the presence of 65 g of polybutene (Napvis 10; BP), 300 g of butyl ethylene-

acrylate copolymer (Lotryl® 30 BA 02; butyl acrylate;: 30%; melt index: 2; Elf Atochem S. A.), 455 g of tackifying resin (Escorez 5320: Exxon), 45 g of wax (25 B; Total) and 5 g of stabilizing agent (Irganox 1010; Ciba-Geigy). /5

The adhesive thus produced is deposited by a coating process onto a polyethylene film over an area 25 mm wide at the rate of 5 g/m<sup>2</sup>. The pasting down is done under the conditions mentioned in example 1.

The measurements taken after application of the coating test at 180 degrees and 200 mm/min are equal to 2.7 N/25 mm and 2.3N/25 mm for the non-woven polyethylene and polyethylene/polyethylene materials respectively.

#### Example 3 (comparative)

One works under the conditions of fiber formation as mentioned in example 1 in the presence of a pressure sensitive hot-melt adhesive based on APAO (TH 706; CECA S.A.).

The resulting compound can be made into fibers only under conditions whereby the temperature is greater than 170 degrees C and the air pressure is greater than 5 bars ( $5 \times 10^5$  Pa)).

#### Example 5 (comparative)

One works under the coating conditions of example 2 as modified in that one use a hot-melt adhesive based on APAO (TH 706; CECA S.A.).

The measurements taken after application of the coating test at 180° and 200 mm/min are equal to 2.5N/25 mm and 2.1N/25 mm for the non-woven/polyethylene and polyethylene/polyethylene materials respectively.

#### Example 6

One applies the hot-melt adhesive in accordance with example 1 to a polyethylene film at the rate of 5 g/m<sup>2</sup> and one performs a pasting down on pad of fluff (cellulose cotton wool).

One soaks the material obtained this way on a 20 cm x 20 cm surface area using 100 ml of water. After 10 minutes one scrapes the fluff by hand. One will observe that the surface area of the polyethylene coated with adhesive remains covered by a fluff film.

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#### Examples 7 and 8 (comparative)

One proceeds under the conditions of example 6 in the presence of a rubber adhesive that contains 25% by weight of a styrene-butadiene-styrene polymer (example 7) or styrene-isoprene-styrene polymer (example 8), 55% by weight of petroleum resin and 20% by weight of naphthene oil. One will observe that

the surface of the polyethylene coated with adhesive does not remain covered with a fluff film after scraping.

#### Example 9

One introduces 150 g of naphthene oil (Nytex 820; Nynas) into a mixer which one brings to 130°C. One adds 220 g of butyl ethylene-acrylate copolymer (Lotryl® 35 BA 320; butyl acrylate: 35%; Melt Index; 320; Elf Atochem S. A.), 60 g of butyl ethylene-acrylate copolymer (Lotryl® 30 BA 02; butyl acrylate: 30%; Melt Index: 2; Elf Atochem S. A.), 348 g of resin (Ecr 395; Exxon), 100 g of tackifying resin (Oulupale B 100; Forchem), 120 g of tackifying resin (Uratack 69540; DSM) and 0.2g of stabilizing agent (Irganox 1010; Ciba-Geigy).

The resulting compound which has a viscosity of 3470mPa.s at 150°, is applied by coating at 130° onto siliconized paper (width 25 mm) and transferred to a film of polyethylene.

The adhesive strength measured according to the standard NF Q 34013 is equal to 2.0N/25 mm.

One will not notice any staining on the support.

#### Examples 10 and 11(comparative)

One proceeds under the conditions of example 9 in the presence of an adhesive on the one hand based on a vinyl ethylene-acetate copolymer (XT 7117; Ceca S. A.) And on the other



hand based on a styrene-butadiene-styrene copolymer (TH 712; Ceca S.A.), this latter adhesive being applied at 160°C (limiting temperature for the coating process).

The adhesive strength is equal to 1.7N/25 mm and 2.0N/25 mm respectively.

One will notice traces of staining on the support with the adhesive XT 7117 (example 10).

One will notice deterioration of the support in the presence of the adhesive TH 712 (example 11) due to the high application temperature.

#### Example 12

One works under the conditions of example 1 modified to the extent that one uses a methyl ethylene-acrylate copolymer (Lotryl® 28 MA 175; methyl acrylate: 28% Melt Index: 175; Elf Atochem S. A.).

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After homogenization one will get a pressure sensitive hot-melt adhesive. This compound is deposited by the formation of fibers according to the methods of example 1, pasting down being accomplished on a non-woven material made of polypropylene.

The measurement taken after application of the scraping test at 180° and 200 mm/min is equal to 3.5N/25 mm.

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## CLAIMS

1. Pressure sensitive hot-melt compound characterized in that it includes:

- a) at least one alkyl ethylene-acrylate copolymer
- b) a tackifying resin
- c) possibly a thinning agent and/or a stabilizing agent  
an/or a wax.

2. Compound according to claim 1 characterized in that the alkyl ethylene-acrylate copolymer contains from 15 to 45% by weight of alkyl acrylate.

3. Compound according to one of the claims 1 or 2 characterized in that the alkyl acrylate is selected from among methyl acrylate, butyl acrylate, and 2-ethylhexyl acrylate.

4. Compound according to one of the claims 1 to 3 characterized in that the copolymer has a flow index between 0.5 and 1000.

5. Compound according to one of the claims 1 to 4 characterized in that it has a viscosity between 1000 and 10,000 mPa.s.

6. Compound according to one of the claims 1 to 5 characterized in that it includes:

- from 20 to 50% by weight of alkyl ethylene-acrylate  
copolymer

- from 30 to 80% by weight of tackifying resin

-from 0 to 35% by weight of thinning agent

-from 0 to 1.5% by weight of stabilizing agent

-and from 0 to 15% by weight of wax.

7. Use of the compound according to one of the claims 1 to 6 for the manufacture of articles for hygiene purpose which contain at least one polyolefin support.

8. Use according to claim 7 characterized in that the articles are throw-away diapers and sanitary napkins.

9. Throw-away diaper which includes the compound according to any of the claims 1 to 6.

10. Sanitary napkin which includes the compound according to any of the claims 1 to 6.